

Electrical Safety and Lockout/Tagout

Electrical Safety

LBNL electrical safety requirements are described in:

- **LBNL ESH Manual, Chapter 8;**
- **LBNL Electrical Safety Manual;**
- **LBNL Electrical Safety website.**

All ATAP personnel are responsible for helping to prevent electrical shocks by practicing the following habits, as applicable to their roles:

If you are not a Qualified Electrical Worker (QEW):

- Do not perform electrical work. Submit a Facilities Work Request (for building utilities) or Engineering QEW work request (for experimental equipment).
- Do not use unsafe or damaged equipment. Report it to your supervisor and inform your co-workers.
- Immediately report any electrical shock, regardless of how minor the shock is perceived to be, in accordance with the Electrical Injury Emergency Response protocol <https://electricalsafety.lbl.gov/electrical-safety/emergency-response/>

Qualified Electrical Workers (QEW-R, QEW-1, or QEW-2):

- Continually apply the ISM process in the performance of daily work activities.
- Only perform electrical work within the limits of your level of qualification as a QEW and authorization under Work Planning and Control Activities.
- Satisfactorily complete all training and certification requirements necessary to maintain certification as a QEW-R, QEW-1, or QEW-2.
- Comply with all LBNL electrical safety program requirements of EHS Manual Chapter 8 and the Electrical Safety Manual.
- Only perform work on electrical equipment that has been placed in an electrically safe work condition, unless proper authorization has been obtained and required controls have been established.
- Comply with all the steps and requirements listed in written procedures, such as Lockout/Tagout Procedures, Electrical Safety Work Plans, Switching Plans, and Energized Electrical Work Permits.
- Stop work and place the equipment in a safe state when questions arise in the implementation of any written procedure. Resolve the issue to everyone's satisfaction prior to restarting work.
- Seek out additional guidance or training for tasks that are performed less than once a year.
- Notify a supervisor of any condition that poses a potential hazard for which you are not able to adequately analyze the hazard or develop controls.
- Post **Field Guide 0, Electrical Injury Emergency Response**, in areas where electrical work is performed. Immediately report any electrical shock, regardless

of how minor the shock is perceived to be, in accordance with the Electrical Injury Emergency Response protocol: <https://electricalsafety.lbl.gov/electrical-safety/emergency-response/>

Management (Program Heads, Supervisors, Project Leads, Activity Leads):

- Use the Work Planning and Control system to plan and control the work.
- Ensure that only QEWs with the appropriate level of qualification and authorization perform work on electrical equipment.
- Ensure that QEWs receive the proper on-the-job training, tools, and PPE necessary to perform their assigned work.
- Correct unsafe behavior and conditions (accountability)
- Post **Field Guide 0, Electrical Injury Emergency Response**, in areas where electrical work is performed. Immediately report any electrical shock, regardless of how minor the shock is perceived to be, in accordance with the Electrical Injury Emergency Response protocol: <https://electricalsafety.lbl.gov/electrical-safety/emergency-response/>.

The ATAP Division Safety Coordinator serves as the **Division Electrical Safety Advocate** to assist employees, managers, and Program Safety Coordinators in identifying electrical hazards and developing controls by:

- Coordinating requests for assistance with electrical safety experts from EHS, Engineering, Facilities, and the Electrical Safety Committee;
- Referring to relevant resources including the Electrical Safety website, the Electrical Safety Database (QuickBase), the Electrical Safety Manual, and LBNL electrical safety;
- Communicating changes in requirements and evaluating impacts to ATAP operations.

The **LBNL Electrical Safety Officer**, **LBNL Deputy Electrical Safety Officer**, or the **Engineering Division Electrical Safety Officer** may serve as the **Division Electrical Safety Officer** for ATAP.

Lockout/Tagout

Lockout/Tagout (LOTO) is the method of applying a mechanical lockout device and a tag on an energy isolation by a LOTO Authorized Person in accordance with established procedures in order to control hazardous energies and prevent the equipment from being operated until the lockout device is removed. Personnel who perform LOTO, write/review LOTO procedures, or work on or near equipment where LOTO is performed will have one or more of the following roles as defined by **ES&H Manual Chapter 18**:

LOTO Affected Persons are persons whose job requires them to be near or around the hazard zone (but not within the hazard zone) when equipment or apparatus is being maintained or serviced under a locked-out or tagged-out condition. All visiting scientists, engineers, and affiliates, including participating guests and students, who work in areas in

which LOTO is utilized are considered Affected Individuals. Activity Leads must consider the roles of persons assigned to their Activity, and review the information in Activity Manager about hazards co-located with their Activity, to determine who may work in proximity to a hazard zone. Affected Individuals must complete **LBL0010 Safety, Emergency Management, and Trafficking Persons Training**, which contains a LOTO awareness module. The responsibilities of Affected Individuals are to:

- Follow all LOTO and safety requirements;
- Recognize when LOTO is being used, the general reasons for LOTO, and the importance of not tampering with or removing a lock and tag.

LOTO Line Managers are **WPC Activity Leads** responsible for equipment requiring LOTO or supervisors of personnel performing LOTO. LOTO Line Managers must complete at least **EHS0372 LOTO Awareness for Line Managers**. (Additional training may be required if the Line Manager also performs other LOTO roles.) The responsibilities of LOTO Line Managers are to:

- Ensure written LOTO procedures are generated and maintained where required.
- Prohibit employees from working on equipment requiring LOTO until the worker is trained in and authorized to perform LOTO.
- Ensure that employee LOTO authorization is assigned and documented through a WPC Activity including:
 - Designating specific equipment or categories of equipment to be controlled and ensure that the employee is thoroughly familiar with the equipment (within the context of his or her job function) and with the energy-control procedures.
 - Verifying that workers are qualified to perform the necessary LOTO procedures. A practical exercise may be required by the LOTO Line Manager to demonstrate proficiency.
 - Determine the appropriate levels of training required for each employee and verify that the required training has been completed.
- Ensure consistent policy implementation and reinforcing LOTO rules.
- Contact the LBNL Electrical Safety Officer and follow procedures ESH Manual Chapter 18, Work Process O) to remove LOTO devices in case of a person's absence.
- Ensure that necessary LOTO hardware is available.

LOTO Authorized Person is someone who has completed the required training and is authorized by the LOTO Line Manager to perform LOTO on energy isolation points for the designated equipment to perform service or maintenance. LOTO Authorized Persons must complete **EHS0370 LOTO for Authorized Persons** as well as any procedure-specific, on-the-job training determined by the LOTO Line Manager. Only LOTO Authorized Persons shall apply locks and tags to control hazardous energy. The responsibilities of a LOTO Authorized Person are to:

- Recognize the conditions of work that require LOTO, assess all of the hazardous

- energy sources, use correct procedures and materials to implement LOTO;
- Maintain control over the keys to their personal LOTO locks;
- Apply his or her own personal LOTO lock and tag when performing servicing, maintenance, or modification work; and
- NEVER apply a LOTO lock for anyone else.

Limited LOTO Authorized Person is a person trained and qualified to join a LOTO established by a LOTO Responsible Individual. A person who is only participating in a LOTO by applying their own lock and tag, and who is not responsible for establishing or clearing the LOTO, may be considered a LOTO Authorized Person and perform work under an established LOTO provided that:

1. The person completes EHS0388, Limited Lockout/Tagout for Authorized Persons.
2. A Responsible Individual is assigned to the LOTO and performs a LOTO briefing.
3. The person applies a personal LOTO lock and tag under the direction of the Responsible Individual.

The responsibilities of a Limited LOTO Authorized Person are to:

- Follow the directions of the LOTO Responsible Individual;
- Attend the LOTO Briefing prior to joining a LOTO;
- Maintain control over the keys to his/her personal LOTO locks;
- Apply his/her own personal LOTO lock and tag when performing servicing, maintenance, or modification work;
- NEVER apply or remove a LOTO lock for anyone else.

Cord and Plug LOTO Authorized Person is a person who only performs Simple LOTO on cord-and-plug equipment because they cannot establish exclusive control, and may be considered a LOTO Authorized person provided that the person completes EHS0389, Simple LOTO for Cord-and-Plug Equipment.

LOTO Responsible Individual is the designated Person in Charge of a Complex or Group LOTO procedure and is accountable for the safe execution of the procedure. The people authorized to act as a LOTO Responsible Individual for an Activity will be assigned through the WPC Activity or equivalent work authorization. . LOTO Responsible Individuals must complete **EHS0373 LOTO for Responsible Individuals.**

The responsibilities of a LOTO Responsible Individual are to:

- Conduct the LOTO briefing.
- Manage all changes to the scope of work.
- Ensure all personnel performing work under the LOTO are LOTO Authorized Persons or Limited LOTO Authorized Persons and are personally locked out for their tasks.
- Supervise the authorized persons in the execution of the LOTO procedure.

Subcontractor Authorized Person performs LOTO authorized under a Subcontractor Job Hazards Analysis and LOTO permit. Subcontractors performing LOTO at LBNL are required to submit their company's LOTO Program (or equivalent) to the EHS Electrical Safety Group and obtain a Subcontractor LOTO Permit. The Subcontractor LOTO Permit constitutes authorization to perform LOTO. The Subcontractor LOTO Authorized Person must have been trained and designated as a LOTO Authorized Person under the Subcontractor Company's LOTO Program, and must also complete **EHS0379 LBNL Subcontractor LOTO Orientation training**. (See ES&H Manual Chapter 18, Work Process I).

The **Requester** who authorizes the Subcontractor JHA for the Subcontractor Authorized Person's work ensures that all outside contractors operating under the SJHA are informed of Berkeley Lab LOTO policy by verifying they have completed EHS0379 LBNL Subcontractor LOTO Orientation training and ensures work observations are performed to verify adherence to the Berkeley Lab LOTO policy.

The **LOTO Reviewer and LOTO Approver** roles at ATAP are not assigned to a specific person. When the **LOTO Line Manager** informs the **ATAP Division Safety Coordinator** of a proposed new Complex LOTO procedure, a proposed modification to an existing LOTO procedure, the **ATAP Division Safety Coordinator** will coordinate the review with EHS Electrical Safety.

LOTO Reviewer is a person trained as a LOTO Authorized Person familiar with the types of equipment and energy sources to be controlled by the procedure, who is selected by the division to review a Complex LOTO Procedure (see **ES&H Manual Chapter 18, Work Process P**). The LBNL Electrical Safety Officer, Engineering Division Electrical Safety Officer, or their designee may act as the LOTO Reviewer. The responsibilities of the LOTO Reviewer are to:

- Observe the performance of the LOTO Procedure for the purpose of initial or periodic inspection;
- Verify that the LOTO Procedure is adequate, understood, and being followed by persons participating in the LOTO; and
- Document the completion of the LOTO review in the QuickBase Complex LOTO database.

LOTO Approver is an Electrical Safety Officer or person designated by the LBNL Electrical Safety Officer to approve Complex LOTO Procedures. The LOTO Approver must have technical competence with the types of equipment and energy sources to be controlled by the procedure and with LBNL LOTO Program requirements. The LOTO Approver may obtain additional technical assistance as needed from the LOTO Reviewer and ATAP or Engineering Division staff who are more familiar with the specific systems involved. The responsibilities of the LOTO Approver are to:

- Review the submitted LOTO Procedure for completeness and accuracy;

- Verify that the scope of work is clearly defined, described on the LOTO Procedure, and that the LOTO Safe Zone established in the LOTO Procedure fully encompasses the scope of work; and
- Approve the LOTO Procedure in the QuickBase Complex LOTO Database if and when it meets all requirements in **ES&H Manual Chapter 18, Work Process N**.

Annual Inspection of Complex LOTO Procedures

All **active Complex LOTO Procedures must be inspected at least once during each Fiscal Year**. Procedures that are new or revised and approved within the year meet this requirement. Procedures that are not currently in use or expected to be used before the end of the Fiscal Year are designated as Inactive in the QuickBase Complex LOTO Procedure database.

The inspection includes a review of the accuracy and adequacy of the procedure, as well as a demonstration by a person qualified and authorized to perform the procedure to show that the procedure is understood and is being performed properly. The **inspector** is the **LBNL Electrical Safety Officer, LBNL Deputy Electrical Safety Officer**, or the **Engineering Division Electrical Safety Officer**. The inspection findings are documented in the QuickBase LOTO Procedure Inspection database. It is the responsibility of the **Activity Lead** for the WPC Activity utilizing the LOTO procedure to ensure all corrective actions identified in the inspection are completed.